



# **Native Vegetation Clearance**

## **Main Road, Cherry Gardens - Road Widening**

(VS2023/07)

### **Data Report**

Clearance under the *Native Vegetation Regulations 2017*

21/04/2023

Revised 07/08/2023

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# 1. Application information

## 1.1 Application details

|                               |   |                  |           |
|-------------------------------|---|------------------|-----------|
| <b>Applicant:</b>             | WGA on behalf of Department of Infrastructure and Transport |                  |           |
| <b>Key contact:</b>           | [REDACTED] (WGA)  |                  |           |
| <b>Landowner:</b>             | State Government  |                  |           |
| <b>Site Address:</b>          | Main Road, Chandlers Hill                                   |                  |           |
| <b>Local Government Area:</b> | City of Onkaparinga   | <b>Hundred:</b>  | Noarlunga |
| <b>Title ID:</b>              |   | <b>Parcel ID</b> |           |

## 1.2 Summary of proposed clearance

|   |  |
|---|--|
| <b>Purpose of clearance</b>                                     | Clearance is required to support roadworks along Main Road, Chandlers Hill. These works will improve road safety by sealing road shoulders and installing guard barriers.  |
| <b>Native Vegetation Regulation</b>                             | Regulation 12, Schedule 1, clause 34, Infrastructure   |
| <b>Description of the vegetation under application</b>          | <p>The vegetation within this application has been split into three vegetation associations:</p> <p><b>VA1:</b> <i>E. leucoxylon ssp. leucoxylon</i> +/- <i>E. fasciculosa</i> +/- <i>E. camaldulensis</i> woodland with predominantly non-native shrubs and understorey</p> <p><b>VA2:</b> <i>Acacia pycnantha</i> shrubland with native sclerophyll understorey</p> <p><b>VA3:</b> <i>E. leucoxylon ssp. leucoxylon</i> woodland with <i>Acacia pycnantha</i> and predominantly non-native understorey</p> |
| <b>Total proposed clearance - area (ha) and number of trees</b> | The proposed clearance is 0.159 ha   |
| <b>Level of clearance</b>                                       | Level 3  |
| <b>Overlay (Planning and Design Code)</b>                       | N/A  |
| <b>Mitigation hierarchy</b>                                     | While the works cannot be avoided as they are required for safety reasons, the design has been restricted to the existing road footprint where possible to avoid clearance impacts.  |
| <b>SEB Offset proposal</b>                                      | A payment into the fund of \$4,550.67 with an admin fee of \$250.29  |

## 2. Purpose of clearance

### 2.1 Description

The Department of Infrastructure and Transport has proposed road safety upgrade works to Main Road between Black Road and Chandlers Hill Road in Cherry Gardens (Figure 1). This project is a part of the Adelaide Hills Productivity and Road Safety Package, which aims to improve road safety, road conditions and increase fire resilience in the region. The Main Road upgrades specifically focuses on increasing the width of road curves to satisfy safety requirements for the new operating speed of 60 km/h.

### 2.2 Background

Main Road supports local traffic with the surrounding land uses include agriculture (grazing and cropping) and rural residential. No further development is planned for the site at this time. Native vegetation remnancy in the area is low at 20% within a 5 km radius (NatureMaps, 2023). There are many conservation parks in the surrounding region, with two parks within 5 km of the site, Sturt Gorge Recreation Park (1.3 km) and Scott Creek Conservation Park (2.4 km).

### 2.3 General location map

The road safety upgrade sites occur along Main Road, from the intersection of Main Road and Black Road in the north, to Chandlers Hill Road in the south. A map of the general location is shown in Figure 2.

### 2.4 Details of the proposal

The works will include road widening, sealing of road shoulders within the existing shoulder formation, and installation of guard rail fencing where required.

Current general construction designs are provided in Appendix 3.

### 2.5 Approvals required or obtained

Approvals are required under the following legislation:

- *Native Vegetation Act 1991* (Native Vegetation Clearance Approval)
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Self-assessment)

### 2.6 Native vegetation regulation

The proposed clearance will be assessed under Regulation 12, Schedule 1, clause 34, Infrastructure.

### 2.7 Development Application Information

N/A



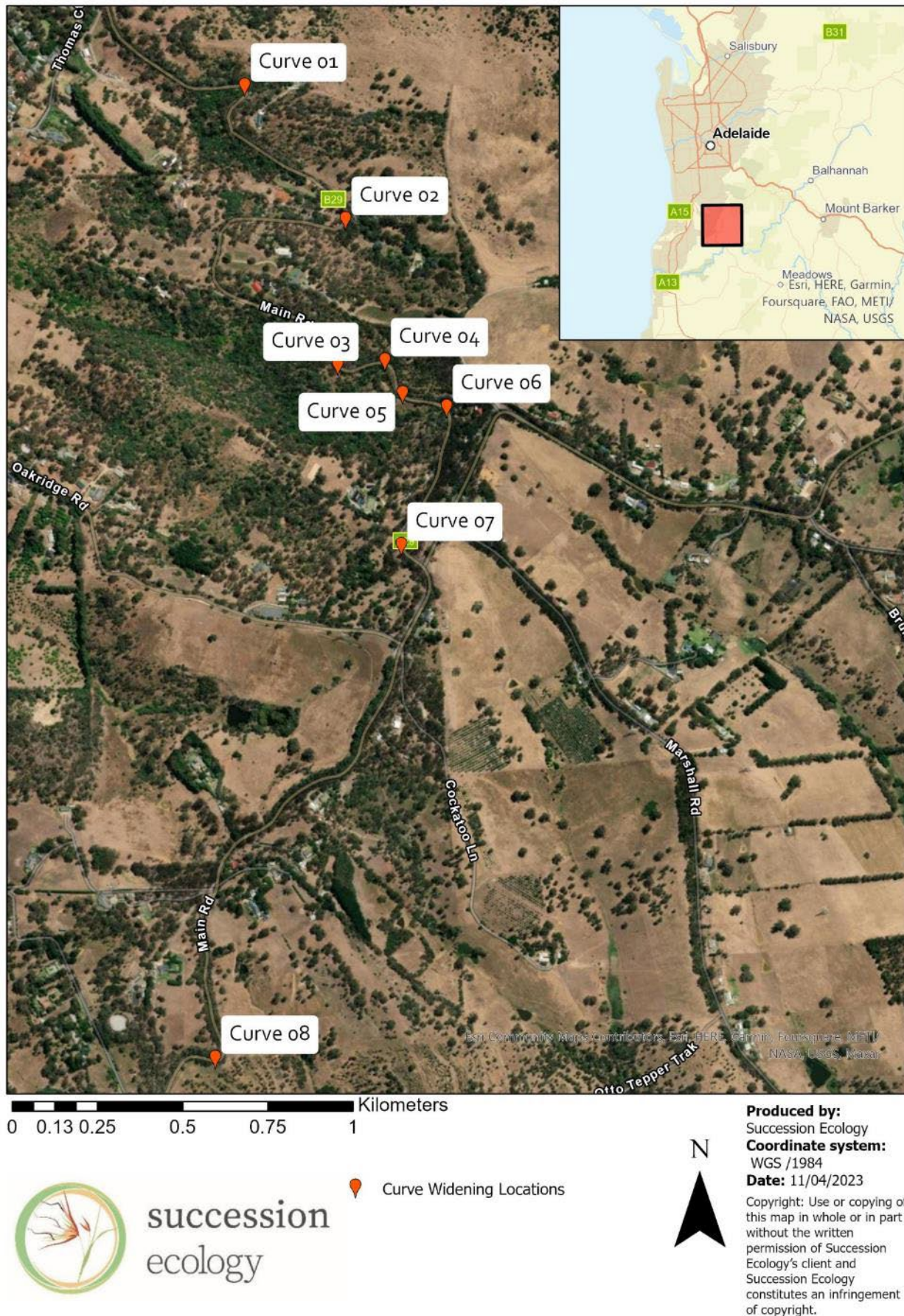


Figure 1: Locations of road upgrade sections on Main Road (RN4640), Chancellors Hill, south of Adelaide CBD. Clearance extents within each VA are provided in 4.1.2 and Appendix 2.

# 3. Method

## 3.1 Flora assessment

### 3.1.1 Desktop assessment

Database searches were used to determine the range of threatened flora species and ecological communities, protected under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* and *National Parks and Wildlife (NPW) Act 1972*, that are likely to occur in the area within a 5 km buffer. The search tools used include:

- A Protected Matters Search to identify matters of national significance under the *EPBC Act*, including threatened species and ecological communities.
- A Biological Database of South Australia (BDBSA) search using NatureMaps to determine flora species recorded within a 5 km radius of the site and species listed under the *NPW Act*.
- Appendices in the NVC Bushland and Scattered Tree Assessment Manuals to determine scattered trees species that provide suitable habitat for threatened fauna and threatened Ecosystems protected under *NPW Act*.
- DEH (in progress) unpublished and provisional list of Threatened Ecosystems to identify threatened and rare ecosystems.

Vegetation types were assessed using satellite imagery and vegetation community data obtained through NatureMaps. All maps were generated using ArcGIS Pro.

### 3.1.2 Field survey

Vegetation surveys were conducted on the 24/11/2022. Vegetation was surveyed using the Bushland (<0.5 ha) Assessment Methodologies, due to the presence of native understorey, the contiguous nature of the vegetation and the connection of the *Eucalyptus* sp. canopies.

## 3.2 Fauna assessment

### 3.2.1 Desktop assessment

A Desktop Assessment was used to determine the range of fauna species that are likely to occur in the area (5 km buffer) and determine whether any threatened fauna may be present. Search tools included:

- A Protected Matters search to identify matters of national significance under the *EPBC Act*, including threatened species.
- A BDBSA search using NatureMaps and ALA to determine fauna species recorded within 5 km radius of the site and species listed under the *NPW Act*.

### 3.2.2 Field survey

A formal fauna assessment was not required for this site as a Level 2 Assessment; however, an opportunistic observation-based survey was conducted to identify any fauna species using this vegetation as habitat. Opportunistic observations included incidental records of non-target species observed while conducting the specified survey technique, or while walking to or from a survey site

# 4. Assessment outcomes

## 4.1 Vegetation assessment

### 4.1.1 General description of the vegetation, the site and matters of significance.

Vegetation is roadside woodlands of multiple *Eucalyptus* species, with major incursions of non-native trees and shrubs. Vegetation composition remains relatively homogenous along this stretch of road, with the main differences being in weed density. Some patches back onto continuous remnant Eucalypt woodland, while some are isolated patches between roadsides and residential or agricultural. The road winds through the upper hillsides of the Mount Lofty Ranges, with some steep drop offs into valleys. Some waterways are present, but they do not hold water year-round. Soils are fertile loams, with few scattered rocky outcrops. Being in the Adelaide hills, the area is highly modified, with high density and diversity of introduced plant species. Declared weeds are present across the site, with dense stands of Olive, Blackberry, English Broom and Gorse, as well as Bridal Creeper in the understorey.

The vegetation within this application has been split into three vegetation associations:

**VA1:** *E. leucoxylon ssp. leucoxylon* +/- *E. fasciculosa* +/- *E. camaldulensis* woodland with predominantly non-native shrubs and understorey

**VA2:** *Acacia pycnantha* shrubland with native sclerophyll understorey

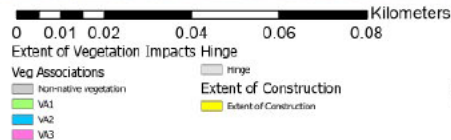
**VA3:** *E. leucoxylon ssp. leucoxylon* woodland with *Acacia pycnantha* and predominantly non-native understorey

Two SEB sites: are present along the road 1995\_2037 at Curve 8 and 2009\_3041 at Curve 5/6 (NatureMaps, 2023). Further, Scott Creek Conservation Park is located 2.5 km to the east of the site, and Sturt Gorge Recreation Park is 1.3 km to the north. No heritage agreements are present within the site.



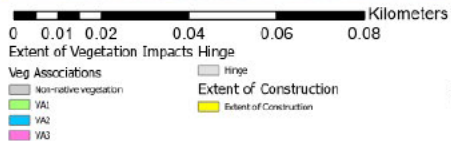
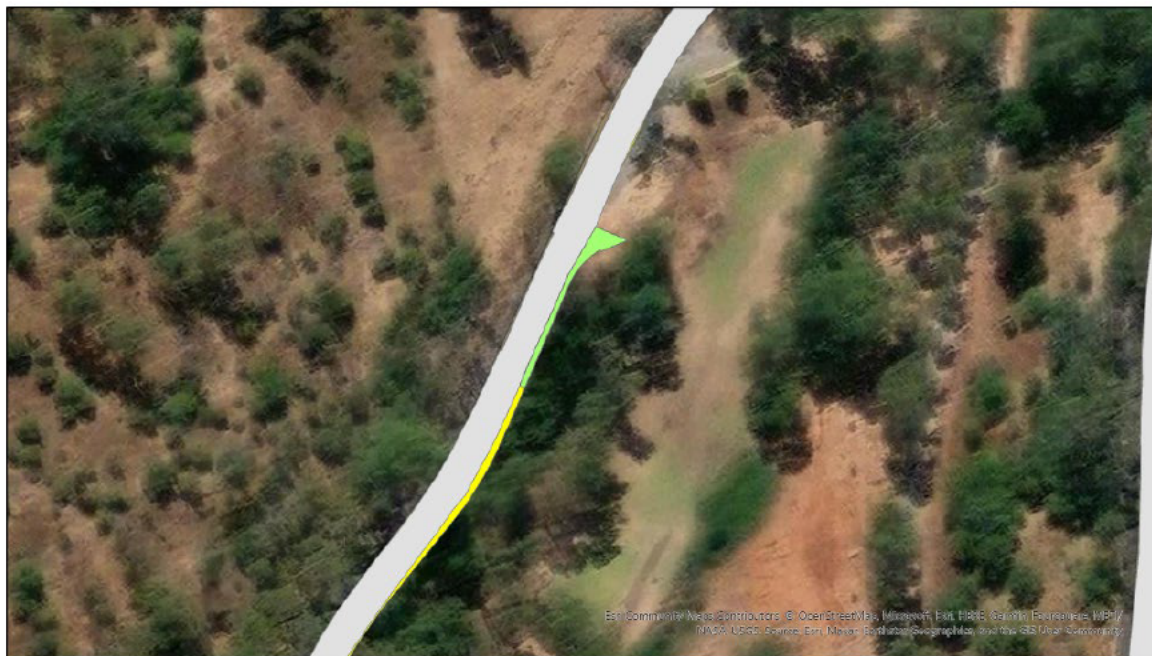
4.1.2 Details of the vegetation associations proposed to be impacted.

|                        |   |
|------------------------|---|
| Vegetation Association | VA1: <i>Eucalyptus leucoxylon ssp. leucoxylon</i> +/- <i>E. fasciculosa</i> +/- <i>E. viminalis ssp. viminalis</i> woodland with predominantly non-native shrubs and understorey (Curves 1 - 6) |
|------------------------|---|



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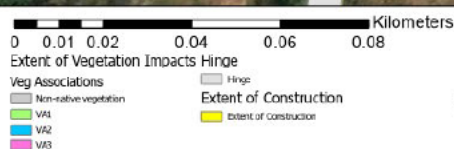


**Vegetation  
Association**

**VA1: *Eucalyptus leucoxylon* ssp. *leucoxylon* +/- *E. fasciculosa* +/- *E. viminalis* ssp. *viminalis* woodland with predominantly non-native shrubs and understorey  
(Curves 1 - 6)**



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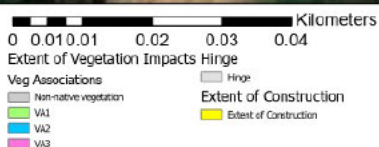


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Figure 2: Clearance areas for VA1, Main Road.



|  |   |                            |       |                                 |      |
|--|---|----------------------------|-------|---------------------------------|------|
| Vegetation Association   | VA1: <i>Eucalyptus leucoxylon ssp. leucoxylon</i> +/- <i>E. fasciculosa</i> +/- <i>E. viminalis ssp. viminalis</i> woodland with predominantly non-native shrubs and understorey (Curves 1 - 6)   |                            |       |                                 |      |
|  |   |                            |       |                                 |      |
| Figure 3: General site images of VA1.  |   |                            |       |                                 |      |
| General description  | <p>The dominant overstorey species was <i>Eucalyptus leucoxylon ssp. leucoxylon</i> with some <i>E. viminalis ssp. viminalis</i>, <i>E. fasciculosa</i> and <i>E. camaldulensis</i>. Tree canopy cover was good, with minimal dieback but only small hollows present. Native understorey was represented by scattered plants, including <i>Rytidosperma sp.</i> and <i>A. pycnantha</i>. This understorey made up at least 5% of the understorey. Environmental and declared weeds present, including Blackberry, Bridal Creeper and Olive. The density of weeds is thick, with a dense layer of Olive and Blackberry in the midstorey.</p>   |                            |       |                                 |      |
| Threatened species or community  | <p><u>Threatened Ecological Communities</u><br/>No threatened ecological communities were present within this habitat.</p> <p><u>Threatened Fauna</u><br/>A 5 km NatureMaps search of the block showed 22 threatened fauna species as being recorded within the area since 1995. Four of which are listed as Endangered, 12 as Rare, and six as Vulnerable under the <i>NPW Act</i>. Of these species, five are also protected under the <i>EPBC Act</i>. A 5 km Protected Matters search identified one additional species protected under the <i>EPBC Act</i> as being known, or having habitat known to occur within the area. A full list of these species and the likelihood of them using the habitat present is provided in Table 2.</p> <p><u>Threatened Flora</u><br/>A total of 57 threatened flora species have been recorded within 5 km of the site since 1995, as shown by a NatureMaps search. A further three threatened species were recorded in the same area by a Protected Matters search. A full list of these species and the likelihood of them using the habitat present is provided in Table 3.</p> <p>Two threatened flora species were recorded within this vegetation assessment, <i>Eucalyptus fasciculosa</i> and <i>E. viminalis ssp. viminalis</i>. Both species are listed as Rare under the <i>NPW Act</i>.</p> |                            |       |                                 |      |
| Landscape context score  | 1.13  | Vegetation Condition Score | 15.13 | Conservation significance score | 1.14 |
| Unit biodiversity Score  | 19.48   | Area (ha)                  | 0.126 | Total biodiversity Score        | 2.45 |





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Figure 4: Clearance areas for VA1, Main Road.





|  |   |
|--|---|
| Vegetation Association   | VA2: <i>Acacia pycnantha</i> shrubland with native sclerophyll understorey (Curve 7)  |
|    |   |
| Figure 5: General site images of VA2 (Curve 7).  |   |
|   |   |
| Figure 6: Declared weed, Bridal Creeper.   |   |
|    |   |
| Figure 7: Native understorey species from left to right: <i>Hibbertia crinita</i> , <i>Burchardia umbellata</i> , <i>Bulbine bulbosa</i> and <i>Brunonia australis</i> . |   |
| General description  | The vegetation within this patch was in good condition and is a Bush for Life revegetation site. The dominant overstorey species was <i>Acacia pycnantha</i> . The mid and understorey had a high |



|  |   |                                   |       |  |      |
|--|---|-----------------------------------|-------|--|------|
| <b>Vegetation Association</b>          | <b>VA2: <i>Acacia pycnantha</i> shrubland with native sclerophyll understorey (Curve 7)</b>   |                                   |       |  |      |
|  | <p>diversity of sclerophyll and heath species. Some environmental and declared weeds were still present (Bridal Creeper), but at a lower density and diversity. Given the history of revegetation and weed control by Bush for Life, the site is in good condition. It is unclear what species were planted and which have been self-seeded, as such all species have been included into the native species diversity. No further information is known on the history of the site.</p> <p>No trees or large shrubs will be impacted in this vegetation association, only a thin, linear section of understorey will be disturbed.</p>   |                                   |       |  |      |
| <b>Threatened species community</b> or | <p><u>Threatened Ecological Communities</u><br/>No threatened ecological communities were present within this habitat.</p> <p><u>Threatened Fauna</u><br/>A 5 km NatureMaps search of the block showed 22 threatened fauna species as being recorded within the area since 1995. Four of which are listed as Endangered, 12 as Rare, and six as Vulnerable under the <i>NPW Act</i>. Of these species, five are also protected under the <i>EPBC Act</i>. A 5 km Protected Matters search identified one additional species protected under the <i>EPBC Act</i> as being known, or having habitat known to occur within the area. A full list of these species and the likelihood of them using the habitat present is provided in Table 2.</p> <p><u>Threatened Flora</u><br/>A total of 57 threatened flora species have been recorded within 5 km of the site since 1995, as shown by a NatureMaps search. A further three threatened species were recorded in the same area by a Protected Matters search. A full list of these species and the likelihood of them using the habitat present is provided in Table 3.</p> <p>No threatened flora species were observed in the field survey of this site.</p> |                                   |       |  |      |
| <b>Landscape context score</b>         | 1.13  | <b>Vegetation Condition Score</b> | 35.70 | <b>Conservation significance score</b> | 1.10 |
| <b>Unit biodiversity Score</b>         | 44.38   | <b>Area (ha)</b>                  | 0.021 | <b>Total biodiversity Score</b>        | 0.93 |

| Vegetation Association   | VA3 <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> woodland with native and predominantly non-native understorey   |
|--|---|
| <div data-bbox="199 237 1366 1041" data-label="Figure"> </div> |   |
| General description  | <p>Despite being a much more isolated patch of native vegetation, with cleared agricultural land on either side, this VA was in fair condition. The dominant overstorey was <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> with a mid storey of <i>Acacia pycnantha</i>. The mature tree score was low as most trees were juvenile. No hollows were observed. There was regeneration of <i>A. pycnantha</i> and <i>Eucalyptus</i> species. Native understorey was represented by scattered plants, including <i>Rytidosperma</i> sp. and <i>A. pycnantha</i>. This understorey made up at least 5% of the understorey. Weed density and diversity was lower than VA1, with an open midstorey as compared to the dense shrub layer of Olive.</p>  |
| Threatened species community or                                | <p><u>Threatened Ecological Communities</u></p> <p>No threatened ecological communities were present within this habitat.</p> <p><u>Threatened Fauna</u></p> <p>A 5 km NatureMaps search of the block showed 22 threatened fauna species as being recorded within the area since 1995. Four of which are listed as Endangered, 12 as Rare, and six as Vulnerable under the <i>NPW Act</i>. Of these species, five are also protected under the <i>EPBC Act</i>. A 5 km Protected Matters search identified one additional species protected under the <i>EPBC Act</i> as being known, or having habitat known to occur within the area. A full list of these species and the likelihood of them using the habitat present is provided in Table 2.</p> <p><u>Threatened Flora</u></p> <p>A total of 57 threatened flora species have been recorded within 5 km of the site since 1995, as shown by a NatureMaps search. A further three threatened species were recorded in the same area by a Protected Matters search. A full list of these species and the likelihood of them using the habitat present is provided in Table 3.</p> |



|                                |  |                                   |       |  |      |
|--------------------------------|--|-----------------------------------|-------|--|------|
| <b>Vegetation Association</b>  | <b>VA3 <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> woodland with native and predominantly non-native understorey</b> |                                   |       |  |      |
|                                | No threatened flora species were observed in the field survey of this site.  |                                   |       |  |      |
| <b>Landscape context score</b> | 1.13   | <b>Vegetation Condition Score</b> | 20.00 | <b>Conservation significance score</b> | 1.10 |
| <b>Unit biodiversity Score</b> | 24.86  | <b>Area (ha)</b>                  | 0.012 | <b>Total biodiversity Score</b>        | 0.52 |

### Photo log

Photos of the vegetation community and scattered trees are provided in the descriptions above.

## 4.2 Threatened species assessment

### 4.2.1 Threatened ecological communities.

Four threatened ecological communities were identified as potentially present within the project footprint from a desktop search of Protected Matters (PMST) and the DEH (in progress) Provisional List of Threatened Ecosystems (DEH, 2001). No threatened ecological communities were identified in the field survey.

*Table 1: Threatened ecological communities with the potential to occur within the Project, and a likelihood assessment. \*No ecosystems have an official State rating. State ratings as provided by DEH 2001.*

| Community  | Status*  | Likelihood  |
|--|--|---|
| Grey Box ( <i>Eucalyptus microcarpa</i> ) In feature are Grassy Woodlands and Derived Native Grasslands of South-eastern Australia             | EPBC Act - Endangered                                  | Unlikely – field surveys did not identify <i>E. microcarpa</i> within the clearance footprint, and minimal native grasses |
| <i>E. odorata</i> +/- <i>E. leucoxylon</i> Grassy Low Woodland on loamy soils of low hills   | EPBC Act – Critically Endangered<br>State - Endangered | Unlikely – field surveys did not identify <i>E. odorata</i> within the clearance footprint                                |
| <i>E. fasciculosa</i> +/- <i>E. leucoxylon</i> Heathy Woodland on sandy loams of flats and slopes.   | State - Vulnerable                                     | Possible – <i>E. fasciculosa</i> and <i>E. leucoxylon</i> present but without heathy understorey                          |
| <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> and/or <i>E. viminalis</i> ssp. <i>viminalis</i> Woodland on alluvial soils in moist areas | State - Vulnerable                                     | Possible – relevant species present but clearance area is on hill tops and hill sides, not in alluvial fans.              |

### 4.2.2 Threatened Fauna

A 5 km NatureMaps search of the block showed 22 threatened fauna species as being recorded within the area since 1995. Four of which are listed as Endangered, 12 as Rare, and six as Vulnerable under the *NPW Act*. Of these species, five are also protected under the *EPBC Act*. A 5 km Protected Matters search identified one additional species protected under the *EPBC Act* as being known, or having habitat known to occur within the area. None of these species were recorded on the site. Table 4 provides a summary of the likelihood of these species using the site following the metric described in Table 2. Marine and migratory species have been excluded from this analysis.

### 4.2.3 Threatened Flora

A total of 57 threatened flora species have been recorded within 5 km of the site since 1995, as shown by a NatureMaps search. A further three threatened species were recorded in the same area by a Protected Matters search. Under the *NPW Act*, 11 of these species are Endangered, 42 are Rare, and six are Vulnerable. Under the *EPBC Act*, one species is Critically Endangered, five are Endangered, and five are Vulnerable. A full list of these species and the likelihood of them using the habitat present is provided in Table 3.

Table 2: A summary of the fauna species observed on site or recorded within 5 km of the application area since 1995.

| Species (common name)  | NPW Act | EPBC Act | Data source | Date of last record | Species known habitat preferences   | Likelihood of use for habitat – Comments  |
|--|---------|----------|-------------|---------------------|---|---|
| <b>AMPHIBIA</b>  |         |          |             |                     |   |   |
| <i>Pseudophryne bibronii</i> (Brown Toadlet)                         | R       | -        | 3           | 2018                | Dry forest, woodland, shrubland and grassland. They shelter under leaf litter and other debris in moist soaks and depressions (Frogs of Australia, 2020).   | Likely – recent records and may potentially occur in areas where leaf litter is dense |
| <b>AVES</b>  |         |          |             |                     |   |   |
| <i>Anhinga novaehollandiae novaehollandiae</i> (Australasian Darter) | R       | -        | 3           | 2019                | Found in wetlands and sheltered coastal waters, mainly in the Tropics and Subtropics. Most often seen inland, around permanent, and temporary water bodies. Prefer smooth, open waters for feeding, with tree trunks and branches for drying. Can be seen in calm seas near shore (Birdlife, 2022). | Unlikely – habitat not present  |
| <i>Biziura lobata menziesi</i> (Musk Duck)                           | R       | -        | 3           | 2022                | Deep freshwater lagoons with dense reed beds (Australian Museum, 2021).   | Unlikely – habitat not present  |
| <i>Corcorax melanorhamphos</i> (White-winged Chough)                 | R       | -        | 3           | 2022                | Woodland and tall mallee, with a preference for wetter areas with leaf-litter for feeding and mud for building nests (DEH, 2014).   | Likely – broad habitat preferences, recent observations                               |
| <i>Coturnix ypsilophora australis</i> (Brown Quail)                  | V       | -        | 3           | 2017                | Dense grassland, edges of open forests (Birdlife Australia, 2021).  | Unlikely – dense grasslands not present   |
| <i>Falco hypoleucos</i> (Grey Falcon)                                |         | VU       | 5           |                     | Arid-zone open woodlands and open Acacia shrublands. Especially stony and sandy plains, hummock and tussock grasslands, low shrublands and wooded watercourses (DEW, 2021).   | Unlikely – habitat not present  |
| <i>Falco peregrinus macropus</i> (Peregrine Falcon)                  | R       | -        | 3           | 2014                | Use a broad range of habitats from rainforest to arid. Need abundant prey and secure nest sites (DEH, 2009).  | Highly likely – habitat present   |
| <i>Falcunculus frontatus frontatus</i> (Eastern Shrike-tit)          | R       | -        | 3           | 2013                | Found in a variety of habitats, including woodlands, scattered trees, forested gullies. Rarely feeds near the ground (Australian Museum, 2020).   | Highly likely – habitat present   |

| Species (common name)  | NPW Act | EPBC Act | Data source | Date of last record | Species known habitat preferences  | Likelihood of use for habitat – Comments   |
|--|---------|----------|-------------|---------------------|--|--|
| <i>Hylacola pyrrhopygia parkeri</i> (Chestnut-rumped Heathwren)        | E       | EN       | 3 & 5       | 2021                | Inhabits heathlands and woodlands with dense shrub and ground-layer vegetation, most commonly found in rocky areas. (DEH Threatened Species Profile, 2008).  | Highly likely – habitat present  |
| <i>Lathamus discolor</i> (Swift Parrot)                                | E       | CR       | 3           | 1995                | Breed in tree-hollows in old-growth or other forest with suitable hollows, in relatively close proximity to the main food source, flowering Tasmanian blue gum (Threatened Species Scientific Committee, 2016).  | Unlikely – rarely observed in the Mount Lofty Ranges (Threatened Species Scientific Committee, 2016) |
| <i>Melithreptus gularis</i> (Black-chinned Honeyeater)                 | V       | -        | 3           | 2008                | Subspecies <i>M. gularis gularis</i> is Vulnerable. Occupy dry Eucalypt woodland with an annual rainfall range of 400-700 mm, particularly associations containing ironbark and box. Favoured habitats incorporate a mixture of mature and regenerating woodland Eucalypts, although adjacent scattered paddock trees are also used (DEH, 2021). | Possible – rainfall outside of range but some habitat features present                               |
| <i>Neophema elegans elegans</i> (Elegant Parrot)                       | R       | -        | 3           | 2021                | Wide range of open habitats, including grasslands, shrublands, mallee, woodlands and thickets, bluebush plains, heathlands, saltmarsh and farmland (Birdlife Australia, 2021).   | Highly likely – habitat present  |
| <i>Petroica boodang boodang</i> (Scarlet Robin)                        | R       | -        | 3           | 2022                | Eucalypt forests and woodlands (DEW, 2019).  | Highly likely – habitat present  |
| <i>Turnix varius varius</i> (Painted Buttonquail)                      | R       | -        | 3           | 2002                | Various Eucalypt habitats, with a preference for areas with leaf litter (DEW, 2019).   | Highly likely – habitat present  |
| <i>Zanda funerea whiteae</i> (Yellow-tailed Black Cockatoo)            | V       | -        | 3           | 2021                | Inhabits a variety of habitats, favours eucalypt woodland and pine plantations (Birdlife Australia, 2021).   | Highly likely – habitat present  |
| <i>Zoothera lunulata halmaturina</i> (South Australian Bassian Thrush) | R       | EN       | 3 & 5       | 2021                | Damp, densely forested areas and gullies are favoured, usually with a thick canopy overhead and leaf-litter below (DEH, 2008)  | Likely – some suitable habitat present   |

| Species (common name)  | NPW Act | EPBC Act | Data source | Date of last record | Species known habitat preferences  | Likelihood of use for habitat – Comments   |
|--|---------|----------|-------------|---------------------|--|--|
| <b>MAMMALIA</b>  |         |          |             |                     |  |  |
| <i>Antechinus flavipes</i> (Yellow-footed Antechinus)  | V       | -        | 3           | 2021                | Occupies a variety of habitats, including dry arid scrubland and sclerophyll forest (Menkhorst, 2001).   | Highly likely – low habitat specificity and recent records                               |
| <i>Isoodon obesulus obesulus</i> (Southern Brown Bandicoot)  | V       | EN       | 3 & 5       | 2021                | The southern brown bandicoot prefers dense vegetation, including wetland fringes and heathland (Woinarski, 2014).  | Possible – recent records but dense vegetation not present                               |
| <i>Ornithorhynchus anatinus</i> (Platypus)   | E       | -        | 3           | 2017                | They prefer habitat with the presence of logs, twigs, and roots, as well as cobbled or gravel water substrate result in increased macroinvertebrate fauna (a main food source), and the Platypus also tends to be more abundant in areas with pool-riffle sequences. | Unlikely – habitat not present   |
| <i>Pteropus poliocephalus</i> (Grey-headed Flying-fox)   | R       | VU       | 3           | 2020                | Typically roost in tall dense trees next to a water source. They will move up to 20 km from their roost site to forage (DEW, 2020).  | Possible – may use trees to forage but unlikely to roost due to distance to water source |
| <i>Trichosurus vulpecula</i> (Common Brushtail Possum)   | R       | -        | 3           | 2022                | Inhabits woodland, forests, heath, and urban areas using trees with hollows for nesting (Australian Museum, 2020).   | Highly likely – recent records and habitat present                                       |
| <b>REPTILIA</b>  |         |          |             |                     |  |  |
| <i>Egernia cunninghami</i> (Cunningham's Skink)  | E       | -        | 3           | 2017                | Forests and woodlands with rocky outcrops (Australian Museum, 2021).   | Possible – recent records and some suitable habitat present                              |
| <i>Varanus rosenbergi</i> (Heath Goanna)   | V       | -        | 3           | 2012                | Prefers sandy heathland, open woodland, or sclerophyll forest, although the species is known to occur in other vegetation types (Landscape SA, 2020)   | Unlikely – habitat not suitable  |
| Source; 1- BDBSA, 2 - ALA, 3 – NatureMaps, 4 – Observed/recorded in the field, 5 - Protected matters search tool, 6 – others<br>NP&W Act; E= Endangered, V = Vulnerable, R= Rare<br>EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable |         |          |             |                     |  |  |



Table 3: A summary of the flora species observed on site or recorded within 5km of the application area since 1995.

| Species (common name)  | NPW Act | EPBC Act | Data source | Date of last record | Species known habitat preferences   | Likelihood of use for habitat – Comments (Table 2)  |
|--|---------|----------|-------------|---------------------|---|---|
| <i>Acacia dodonaeifolia</i> (Hop-bush Wattle)                | R       | -        | 3           | 2000                | Mainly in woodland and open forest vegetation formation (Electronic Flora of SA, 2021).   | Possible – broad habitat preferences, but no recent records   |
| <i>Acacia iteaphylla</i> (Flinders Ranges Wattle)            | R       | -        | 3           | 2022                | Found in hills on rocky outcrops or in valleys along rocky creeks (Flora of Australia, 2021).   | Highly likely - recorded in field survey outside of the clearance zone (southern end of Main Road), potentially planted |
| <i>Allocasuarina robusta</i> (Mount Compass Oak-bush)        | E       | EN       | 3           | 2001                | Restricted to southern Fleurieu Peninsula, in the Mount Compass and Hindmarsh Valley areas. Grows in low-lying areas with sandy loam soil, often around the margins of swamps and creeks (DEH, 2008). | Unlikely – habitat not present  |
| <i>Anogramma leptophylla</i> (Annual Fern)                   | R       | -        | 3           | 2005                | Grows in shallow soil layers over rock on outcrops in dry or damp sclerophyll forest (Nature Values Atlas, 2019).   | Unlikely – habitat not present  |
| <i>Austrostipa densiflora</i> (Fox-tail Spear-grass)         | R       | -        | 3           | 2008                | Found in grassy woodland, sclerophyll forest and rocky outcrops. Generally in low fertility soils (Grasses of Australia, 2022).   | Unlikely – habitat not present  |
| <i>Austrostipa gibbosa</i> (Swollen Spear-grass)             | R       | -        | 3           | 2018                | Growing in rich loamy soil along creeks and seasonally wet areas in woodland and grassland (Seeds of SA, 2021).   | Highly likely – curve 1 is apart of a watercourse   |
| <i>Austrostipa multispiculis</i> (Many-flowered Spear-grass) | R       | -        | 3           | 2012                | Found in grasslands and eucalypt woodland (DEW, 2017).  | Likely – habitat present and records within the last 20 years   |
| <i>Blechnum nudum</i> (Fishbone Water-fern)                  | R       | -        | 3           | 2004                | Found along forested stream banks, in deeply shaded gullies and alluvial flats, occasional in more exposed situations in poorly drained areas (Flora of Victoria, 2021)                               | Possible – some habitat present but record from almost 20 years ago   |
| <i>Bothriochloa macra</i> (Red-leg Grass)                    | R       | -        | 3           | 2013                | Found in woodland and grassland. In foothills, not generally in high rainfall forests (DEW, 2017).  | Possible – woodland habitat present, but not foothills  |

| Species (common name)                                     | NPW Act | EPBC Act | Data source | Date of last record | Species known habitat preferences  | Likelihood of use for habitat – Comments (Table 2)                             |
|---|---------|----------|-------------|---------------------|--|--|
| <i>Caladenia behrii</i> (Pink-lipped Spider-orchid)       | E       | EN       | 5           |                     | Occurs on loamy soils in association with <i>Eucalyptus goniocalyx</i> , <i>E. obliqua</i> , <i>E. fasciculosa</i> or <i>E. microcarpa</i> woodland, usually on moderate slopes. Very sensitive to grazing by native and introduced herbivores, and does not persist in weed infested areas (DEH, 2008).   | Unlikely – habitat present but unlikely due to sensitivity to weeds.           |
| <i>Caladenia gladiolata</i> (Bayonet Spider-orchid)       | E       | EN       | 5           |                     | Found in woodland, grassland and grassy open forest on fertile loam soils (Landscape SA, 2022).  | Likely – broad habitat preferences, potentially unlikely due to weed presence. |
| <i>Caladenia leptochila</i> (Narrow-lipped spider-orchid) | R       | -        | 3           | 2021                | Occurs singly or in small groups in clay or gravelly soils in open to dense forest. Not uncommon in the Adelaide Hills (Electronic Flora of South Australia species, 2022).  | Highly likely – recent records and suitable habitat.                           |
| <i>Caladenia pusilla</i> (Pigmy Caladenia)                | R       | -        | 3           | 2018                | Occurs in clumps or small groups in clay or gravel soils in exposed sites in open forest, often in soils which are boggy in winter but bake hard in summer (Electronic Flora of SA, 2022).   | Possible – some suitable habitat and recent records.                           |
| <i>Caladenia rigida</i> (Stiff White Spider-orchid)       | E       | EN       | 3 & 5       | 1995                | Found on ridge tops and hillslopes in in open forest dominated by <i>Eucalyptus obliqua</i> , <i>E. goniocalyx</i> , <i>E. leucoxydon</i> , <i>E. fasciculosa</i> , and <i>E. macrocarpa</i> . Sites have a relatively open understorey of low shrubs and sedges dominated by <i>Xanthorrhoea semiplana</i> , <i>Acacia pycnantha</i> , <i>Hibbertia exutiacies</i> , <i>Pultenaea largiflorens</i> , <i>P. daphnoides</i> , <i>Spyridium parvifolium</i> , <i>Hakea rostrata</i> and <i>H. carinata</i> (Threatened Species Scientific Committee, 2021) | Unlikely – no recent records and suitable understorey not present.             |
| <i>Carex gunniana</i>                                     | R       | -        | 3           | 2021                | Grows in wet places (Electronic Flora of SA, 2022).  | Unlikely – habitat not present.  |
| <i>Cladium procerum</i> (Leafy Twig-rush)                 | R       | -        | 3           | 2014                | Occasional in swampy areas and margins of streams and lakes near the coast, tolerating low to moderate levels of salinity (Flora of Victoria, 2021).   | Unlikely – habitat not present.  |

| Species (common name)   | NPW Act | EPBC Act | Data source | Date of last record | Species known habitat preferences  | Likelihood of use for habitat – Comments (Table 2)        |
|---|---------|----------|-------------|---------------------|--|---|
| <i>Correa glabra</i> var. <i>leuoclada</i> (Rock Correa)        | R       | -        | 3           | 2019                | Almost entirely confined to rocky habitats (Electronic Flora of SA, 2021).   | Unlikely – habitat not present.                           |
| <i>Cycnogeton alcockiae</i> (Alcock's Water-ribbons)            | R       | -        |             | 2004                | Found in small streams, stagnant water or coastal brackish habitats (Flora of Victoria, 2019).   | Unlikely – habitat not present.                           |
| <i>Deyeuxia densa</i> (Heath Bent-grass)                        | R       | -        | 3           | 2004                | Commonly in heaths, sedgelands and on stream banks in damp, open to lightly shaded sites, but in rocky sites at high altitudes in the Grampians, Vic. Flowers Oct.–Jan (AusGrass, 2022).   | Possible - some suitable habitat but no recent records.   |
| <i>Dianella longifolia</i> var. <i>grandis</i> (Pale Flax-lily) | R       | -        | 3           | 2020                | Grassy woodlands (Seeds of SA, 2021).  | Possible – recent records but minimal native grass areas. |
| <i>Drosera praefolia</i> (Early Sundew)                         | R       | -        | 3           | 1995                | Dry exposed sites in compacted clay-sand over laterite or in lateritic gravel in low woodland associated with <i>Eucalyptus fasciculosa</i> , <i>Acacia paradoxa</i> , <i>Allocasuarina verticillata</i> , <i>Xanthorrhoea semiplana</i> . Often on exposed ridgetops (Bates, 1991). | Possible – no recent records, minimal suitable habitat.   |
| <i>Eryngium ovinum</i> (Blue Devil)                             | V       | -        | 3           | 2017                | Wetter parts of the Mount Lofty Ranges and a few sites in the lower South-East in South Australia, growing in open woodland on damp clay and sandy soils (Seeds of SA, 2022).  | Possible – no recent records, sites not wet enough.       |
| <i>Eucalyptus fasciculosa</i> (Pink Gum)                        | R       | -        | 3           | 2022                | Found in woodlands, low shrublands, in well-drained sandy soils (Seeds of SA, 2018).   | Known – species occurs within the project area.           |
| <i>Eucalyptus pauciflora</i> ssp. <i>pauciflora</i> (Snow Gum)  | V       | -        | 3           | 1997                | Few areas in the lower South-east in South Australia, growing on sand in low forest (Seeds of SA, 2021).   | Unlikely – habitat not present.                           |
| <i>Eucalyptus viminalis</i> ssp. <i>viminalis</i> (Manna gum)   | R       | -        | 3           | 2022                | Open forests, prefers high rainfall areas with well drained soils (Forestry SA, 2007).   | Known – species occurs within the project area.           |

| Species (common name)                              | NPW Act | EPBC Act | Data source | Date of last record | Species known habitat preferences  | Likelihood of use for habitat – Comments (Table 2)                |
|--|---------|----------|-------------|---------------------|--|---|
| <i>Festuca benthamiana</i> (Bentham's Fescue)      | R       | -        | 3           | 2013                | Restricted to the Flinders Ranges (AusGrass2, 2021).   | Unlikely – outside of known species range.                        |
| <i>Gleichenia microphylla</i> (Coral Fern)         | R       | -        | 3           | 2017                | It can form dense thickets to 1.5 m tall in sclerophyll forest but occurs as dense low mounds in open swamps (Australia, 2007).  | Possible – some suitable habitat present.                         |
| <i>Glycine latrobeana</i> (Clover Glycine)         | V       | VU       | 3 & 5       | 2004                | Occurs mainly in grassland and grassy woodland habitats, less often in dry forests, and only rarely in heathland. South Australian sites include low lying, seasonally inundated grassy woodlands dominated by <i>Eucalyptus viminalis</i> subsp. <i>cygnetensis</i> and/or <i>E. leucoxydon</i> subsp. <i>leucoxydon</i> or <i>E. obliqua</i> (Carter and Sutter, 2010) | Unlikely – woodlands not low-lying or seasonally inundated.       |
| <i>Glycine tabacina</i> (Variable Glycine)         | V       | -        | 3           | 2018                | Growing in <i>Eucalyptus camaldulensis</i> woodland, more often in shady or moist gullies on sandy loam soils (Seeds of SA, 2021).   | Highly likely – recent records within the project area.           |
| <i>Grevillea aquifolium</i> (Prickly Grevillea)    | R       | -        | 3           | 2000                | On calcareous sand in sclerophyllous woodland, and in heath on sands, limestone pavements and sandstone outcrops (Australia, 2007)   | Unlikely – no recent records and minimal habitat present.         |
| <i>Hypolepis dicksonioides</i> (Downy Ground-fern) |         | VU       | 3           | 2017                | This species is known from a few localities in the Mt Lofty Ranges where it grows in moist open situations or along stream banks. Presumed to be a glass-house escape (Electronic Flora of SA, 2007)   | N/A: Threatened in Norfolk Island, naturalized in South Australia |
| <i>Hypolepis rugosula</i> (Ruddy Ground-fern)      | R       | -        | 3           | 2017                | Forms dense thickets along shady forested streams or in more open wetter areas, frequently in ditches or on embankments beside tracks (Flora of Victoria, 2018)  | Possible – recent records but site provides limited habitat       |
| <i>Juncus amabilis</i>                             | V       | -        | 3           | 2003                | In the Adelaide Mount Lofty Ranges, <i>Eucalyptus microcarpa</i> and <i>E. camaldulensis</i> woodland, cleared grazing land of mostly introduced pasture plants and Blackberries, also some <i>Juncus flavidus</i> and <i>J. pallidus</i> , grassy roadside areas, dam edges with <i>Juncus nodosa</i> , <i>J. pallidus</i> , <i>J. articulatus</i> ,                    | Unlikely – habitat not present.                                   |

| Species (common name)   | NPW Act | EPBC Act | Data source | Date of last record | Species known habitat preferences  | Likelihood of use for habitat – Comments (Table 2) |
|---|---------|----------|-------------|---------------------|--|--|
|   |         |          |             |                     | <i>Pennisetum clandestinum</i> , <i>Persicaria prostrata</i> and <i>Craspedia cunninghamii</i> , generally with <i>Carex bichenoviana</i> and <i>C. appressa</i> (DEH, 2008)   |  |
| <i>Juncus australis</i>   | R       | -        | 3           | 2009                | Occurs in wet depressions and along drainage lines from sea-level to the subalps (Flora of Victoria, 2019)   | Unlikely – habitat not present.                    |
| <i>Leionema hillebrandii</i> (Mount Lofty Phebalium)                                  | R       | -        | 3           | 1995                | In the Adelaide Mount Lofty Ranges, habitats include: <ul style="list-style-type: none"> <li>• Scott Creek CP: amongst rocks on a moss covered rocky outcrop, low open woodland to shrubland; in association with <i>Eucalyptus obliqua</i>, <i>Acacia pycnantha</i>, <i>Prostanthera behriana</i>, <i>Allocasuarina muelleriana</i> and <i>Spyridium parvifolium</i></li> <li>• Bridgewater: in open woodland to shrubland with <i>Eucalyptus baxteri</i>, <i>Spyridium parvifolium</i>, <i>Ixodia achillaeoides</i> and <i>Hakea carinata</i></li> <li>• Blackwood Golf Course, Cherry Gardens: on slope overlooking creek, very rocky area, <i>Eucalyptus cosmophylla</i>, <i>E. obliqua</i> association with scattered <i>Exocarpos cupressiformis</i>, <i>Leptospermum</i> sp. and <i>Daviesia ulicifoli</i> (DEH, 2008)</li> </ul> | Unlikely – habitat not present.                    |
| <i>Logania saxatilis</i> (Rock Logania)   | R       | -        | 3           | 2020                | Steep-sided sandstone gorges in open woodland and crevices of rocky outcrops in shallow sandy or clay-rich soils (Seeds of SA, 2021).  | Unlikely – habitat not present.                    |
| <i>Lysiandra calycina</i> (previously <i>Phyllanthus calycinus</i> ; Snowdrop Spurge) | R       | -        | 3           | 2020                | Grows in sandy soil (Electronic Flora of South Australia, 2007).   | Unlikely – habitat not present.                    |
| <i>Machaerina gunnii</i> (Slender Twig-rush)  | R       | -        | 3           | 2021                | Occurring in wet heathlands and swampy woodlands (Wilson, 1994).   | Unlikely – habitat not present.                    |
| <i>Machaerina laxa</i> (Lax Twig-rush)  | R       | -        | 3           | 2021                | Occurs in wet sandy areas in heathlands and heathy swamps (Wilson, 1994).  | Unlikely – habitat not present.                    |



| Species (common name)  | NPW Act | EPBC Act | Data source | Date of last record | Species known habitat preferences  | Likelihood of use for habitat – Comments (Table 2)   |
|--|---------|----------|-------------|---------------------|--|--|
| <i>Mentha diemenica</i> (Slender Mint)                         | R       | -        | 3           | 2004                | Grassland and forest habitats (Australian National Botanic Gardens, 2012).   | Possible – broad habitat preferences but no recent records.  |
| <i>Olearia pannosa</i> ssp. <i>pannosa</i> (Silver Daisy-bush) | R       | VU       | 3           | 1995                | Grows in flat, sandy terrain and areas with rocky soils. Often occur in narrow roadside remnants (Landscape SA, 2014).   | Unlikely – limited suitable habitat and no recent records.   |
| <i>Phyllangium distylis</i>                                    | R       | -        | 3           | 2017                | In lowland sedgeland and wet sandy flats in open-heath and woodlands (Flora of Victoria, 2020).  | Unlikely – habitat not present.  |
| <i>Potamogeton ochreatus</i> (Blunt Pondweed)                  | R       | -        | 3           | 1995                | Occurs in still to strongly flowing fresh water, in agricultural dams, swamps, creeks and rivers, on muddy to gravelly substrates (Flora of Victoria, 2022).   | Unlikely – habitat not present.  |
| <i>Prasophyllum pallidum</i> (Pale Leek-orchid)                | R       | VU       | 3 & 5       | 2008                | Fertile soils of woodland and well-grassed open forests (Seeds of SA, 2019).   | Possible – records within the last 20 years and some suitable habitat.   |
| <i>Prasophyllum pruinosum</i> (Plum Leek-orchid)               | E       | EN       | 3 & 5       | 2016                | Open woodland habitats, usually with an overstorey of <i>Eucalyptus fasciculosa</i> and/or <i>E. leucoxylon</i> (Bates, 2008; State Herbarium of South Australia, 2009; Quarmby, pers. comm., 2009; Brewer, pers. comm., 2009). It has been recorded from a range of soil types from sandy loams to heavy clays (Bates, 2008; State Herbarium of South Australia, 2009). The species is usually found on the lower slopes of hills, often with a south facing aspect, but it is also known from upper slopes and west facing aspects (Quarmby, pers. comm., 2009). | Likely – records within the last 10 years and suitable habitat present.  |
| <i>Pterostylis cucullata</i> (Leafy Greenhood)                 | E       | VU       | 5           |                     | Subspecies <i>cucullata</i> occurs in lowland <i>Leptospermum laevigatum</i> or <i>Melaleuca lanceolata</i> coastal scrub on stabilized sand dunes, with an open understorey and grassy and herbaceous groundcover on seasonally damp but well-drained, humus-rich sandy loams. In South Australia, ssp. <i>sylicola</i> occurs in open forest and woodland of <i>E.</i>   | Possible – suitable habitat for subspecies <i>sylicola</i> , but no records within 5 km of the site in the last 25 years (ALA, 2023) |

| Species (common name)                                    | NPW Act | EPBC Act | Data source | Date of last record | Species known habitat preferences   | Likelihood of use for habitat – Comments (Table 2)                      |
|--|---------|----------|-------------|---------------------|---|---|
|  |         |          |             |                     | <i>leucoxylon</i> , often with <i>E. obliqua</i> or <i>E. camaldulensis</i> (Threatened Species Scientific Committee, 2016).  |   |
| <i>Pterostylis foliata</i> (Slender Greenhood)           | R       | -        | 3           | 2013                | Occurs in small groups in sheltered, shaded spots in open forest often with <i>Eucalyptus fasciculosa</i> and colonising <i>Pinus radiata</i> plantations (Electronic Flora of SA, 2022). | Likely – records within the last 10 years and suitable habitat present. |
| <i>Ptilotus angustifolius</i> (Narrow-leaf Yellow-tails) | E       | -        | 3           | 2017                | Found in arid regions of SA (Hammer, 2018).   | Unlikely – habitat not present.   |
| <i>Rytidosperma tenuius</i> (Short-awn Wallaby Grass)    | R       | -        | 3           | 2020                | Found in dry sclerophyll forest on sandy soils (National Herbarium of NSW, 2021).   | Possible – recent records and some suitable habitat present.            |
| <i>Senecio pinnatifolius</i> var. <i>pinnatifolius</i>   | R       | -        | 3           | 2000                | Found in areas with moist soil such as around lakes and wetlands. Also, forest, woodlands and grassy areas (Wood, 2022).  | Unlikely – no recent records and minimal suitable habitat.              |
| <i>Sphaerolobium minus</i> (Leafless Globe-pea)          | R       | -        | 3           | 2004                | Occurs in wet heath or sometimes forest on sandy or peaty soils (National Herbarium of NSW, n.d), in sclerophyll forests, woodlands and heathlands (Flora of Victoria, 2019).             | Possible – records within 20 years and suitable habitat present.        |
| <i>Thelymitra aristata</i> (Great Sun-orchid)            | E*      | -        | 3           | 2005                | Occurs singly or in small groups in clay or gravel soils in forest or scrubland (Electronic Flora of South Australia, 2022).  | Possible – records within 20 years and some suitable habitat present.   |
| <i>Thelymitra batesii</i> (Bate's Sun-orchid)            | R       | -        | 3           | 2009                | Heathy woodlands and heathy open forest on sandy and gravelly clay loam soils (Seeds of SA, 2021).  | Possible – records within 20 years and some suitable habitat present.   |
| <i>Thelymitra flexuosa</i> (Twisted sun-orchid).         | R       | -        | 3           | 2018                | Occurs singly or as small clumps of plants in soil which is very wet in winter, in open forest or heathland in higher rainfall districts (Electronic Flora of South Australia, 2022).     | Likely – records within the last 10 years, suitable habitat present.    |
| <i>Thelymitra grandiflora</i> (Great Sun-orchid)         | R       | -        | 3           | 2020                | Occurs singly or in small groups, in clay or gravel soils in forest or scrubland, or in the SE in damp sand around swamp margins (Electronic Flora of SA, 2022).                          | Likely – records within the last 10 years, suitable habitat present.    |

| Species (common name)  | NPW Act | EPBC Act | Data source | Date of last record | Species known habitat preferences   | Likelihood of use for habitat – Comments (Table 2)                    |
|--|---------|----------|-------------|---------------------|---|---|
| <i>Thelymitra ixioides</i> (Spotted Sun-orchid)  | E       | -        | 3           | 2021                | Occurs singly or in small numbers in sandy or gravelly loams in forest in areas receiving greater than 750 mm mean annual rainfall (Electronic flora of South Australia, 2022). | Likely – recent records, suitable habitat present.                    |
| <i>Veronica derwentiana</i> ssp. <i>derwentiana</i> (Derwent Speedwell)  | E       | -        | 3           | 2004                | Moist forests from foothills to subalps (Flora of Victoria)   | Possible - records within 20 years and some suitable habitat present. |
| <i>Veronica derwentiana</i> ssp. <i>homalodonta</i> (Mt Lofty Speedwell)   | E       | CR       | 3 & 5       | 2011                | Grows beside streams and waterfalls or associated with limestone caverns. Occurs in moist sites in gullies or near creeks in high rainfall areas (DEH, 2008).                   | Possible – no recent records and limited habitat.                     |
| <i>Veronica gracilis</i> (Slender Speedwell)   | V       | -        | 3           | 2004                | Usually in grassland or grassy woodland, often near streams, soaks, dams etc. (Flora of Victoria, 2018).  | Possible – no recent records and limited habitat.                     |
| <i>Viminaria juncea</i> (Native Broom)   | R       | -        | 3           | 2017                | Occurs in moist temperate parts of most States. In swamps it can be extensive, a tall loose shrub where crowded (Australian National Herbarium, 2019).                          | Possible - records within 20 years and some suitable habitat present. |
| Source; 1- BDBSA, 2 - ALA, 3 – NatureMaps, 4 – Observed/recorded in the field, 5 - Protected matters search tool, 6 – others<br>NP&W Act; E= Endangered, V = Vulnerable, R= Rare<br>EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable |         |          |             |                     |   |   |

Table 4: Criteria for the likelihood of occurrence of species within the survey area.

| Likelihood          | Criteria  |
|---------------------|---|
| Highly Likely/Known | Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is present and falls within the known range of the species distribution or;<br>The species was recorded as part of field surveys.  |
| Likely              | Recorded within the previous 20 years, the area falls within the known distribution of the species and the area provides habitat or feeding resources for the species.  |
| Possible            | Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area provides limited habitat or feeding resources for the species.<br>Recorded within 20 -40 years, survey effort is considered adequate, habitat and feeding resources present, and species of similar habitat needs have been recorded in the area.  |
| Unlikely            | Recorded within the previous 20 years, but the area provides no habitat or feeding resources for the species, including perching, roosting or nesting opportunities, corridor for movement or shelter.<br>Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area.<br>No records despite adequate survey effort. |

## 4.3 Cumulative impact

*When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must consider the potential cumulative impact, both direct and indirect, that is reasonably likely to result from a proposed clearance activity.*

Vegetation remnancy in the region is low, with 14 – 21% vegetation remaining within 5 km of the site. The cumulative impacts of clearing are the gradual reduction of remnants in the area, a loss of connectivity between remnant patches, and the reduction of habitat available to threatened flora and fauna. Roadside remnants are important habitat refugia in otherwise cleared landscapes and are at a high risk of degradation from clearance and other impacts, such as weed incursion.

This Design Development has gone through an intense design process in order to minimise the impact to native vegetation while still achieving road safety goals. Clearance will mostly be in very narrow strips, and will be restricted to pruning where possible. Eight scour protection mattresses will be installed to reduce erosion at the point of culvert outlets. These surficial structures are not expected to cause any substantial impacts to vegetation. At Curve 1, batters will extend downslope from the road. These batters will largely echo the existing slope, and are only expected to impact the plentiful woody weeds, including Bramble (*Rubus* sp.), that are present at this location. There is also the opportunity to manage multiple Declared Weeds at this site, to the benefit of the vegetation.

The sealing of the road shoulder and installation of guard rail fencing is the only roadworks proposed for these areas at this time and will not require additional works in the future.

Two SEB sites are present along Main Road (IDs: 2009\_3041 and 199\_2037). These sites are located at Curve 6 and Curve 8 and while vegetation clearance is proposed for the side of the road opposite to these sites, care will be taken to avoid any direct or indirect impacts. A Bush for Life site is also present as Curve 7. Design updates have removed impacts to this site, and therefore not contribute to a loss of biodiversity.



## 4.4 Address the mitigation hierarchy

*When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must have regard to the mitigation hierarchy. The NVC will also consider, with the aim to minimize, impacts on biological diversity, soil, water and other natural resources, threatened species or ecological communities under the EPBC Act or listed species under the NP&W Act.*

### **a) Avoidance – outline measures taken to avoid clearance of native vegetation**

The proposed clearance is for road development works to improve road safety for this specific site and as such there are minimal options to avoid impacts. Works have been kept within the road footprint where possible, with road widening chosen strategically to avoid the sides of the curve with native vegetation, especially large trees.

### **b) Minimization – if clearance cannot be avoided, outline measures taken to minimize the extent, duration and intensity of impacts of the clearance on biodiversity to the fullest possible extent (whether the impact is direct, indirect or cumulative).**

The project has gone through an extensive planning phase that has aimed to maintain as much of the large trees and native vegetation, while still achieving the traffic safety aims. This has included detailed site assessments by ecologist, arborists, and civil planners, which were then incorporated into the planning of infrastructure works to ensure the minimum amount of vegetation disturbance. The detailed design development, has clarified and optimised various design assumptions including:

- DIT approval of design departures and acceptance of the use of Extended Design Domain when undertaking road design. This has allowed for reduction in proposed curve widening extents, reducing the road footprint.
- DIT direction to use a higher containment road barrier type and providing a reduced barrier dynamic deflection. This helps the design reduce vegetation impacts by reducing the expected roadside barrier clear zone extents.
- Optimisation of proposed retaining wall designs: DIT have accepted minor land acquisition in certain areas, allowing for construction of fill batters as opposed to a large, engineered solution. Post and sleeper retaining wall design also reduces the retaining wall footprint significantly.

All of the above factors help to reduce the overall project footprint, thus reducing the extents of vegetation impacts. This is shown by the decreased the number of trees requiring removal. Within 70% design a total of 74 trees (assessed within BAMs) were proposed to be cleared. Now, at 100% design, there are only 32 trees marked for removal (as shown in Appendix 3). Further, the design updates have specifically minimised the vegetation clearance required within VA2 and avoid all large trees and shrubs in this area. This will maintain the vegetation present within the Bush for Life site, assisting in the conservation of native biodiversity in the area.

### **c) Rehabilitation or restoration – outline measures taken to rehabilitate ecosystems that have been degraded, and to restore ecosystems that have been degraded, or destroyed by the impact of clearance that cannot be avoided or further minimized, such as allowing for the re-establishment of the vegetation.**

Due to the narrow, linear nature of the impact zone, and considering the purpose of this roadworks, it is not practical to rehabilitate or restore native vegetation in this area. DIT can contribute to the improvement of the remaining roadside remnants through the control of declared weeds.

### **d) Offset – any adverse impact on native vegetation that cannot be avoided or further minimized should be offset by the achievement of a significant environmental benefit that outweighs that impact.**

DIT will contribute an SEB payment into the Native Vegetation fund to support restoration and conservation works in the region.

*The NVC will only consider an offset once avoidance, minimization and restoration have been documented and fulfilled. The SEB Policy explains the biodiversity offsetting principles that must be met.*



## 4.5 Principles of clearance (*Schedule 1, Native Vegetation Act 1991*)

The Native Vegetation Council will consider Principles 1(b), 1(c) and 1(d) when assigning a level of Risk under Regulation 16 of the Native Vegetation Regulations. The Native Vegetation Council will consider all the principles of clearance of the Act as relevant, when considering an application referred under the *Planning, Development and Infrastructure Act 2016*.

| Principle of clearance   | Relevant information   | Assessment against the principles                                      | Moderating factors that may be considered by the NVC  |
|--|--|--|---|
| <b>Principle 1b - significance as a habitat for wildlife</b>             | <p><u>Threatened species</u> identified in this area within the last 25 years that are likely to use the site:</p> <ul style="list-style-type: none"> <li><i>Hylacola pyrrhopygia parkeri</i> (Chestnut-rumped Heathwren)</li> <li><i>Falcunculus frontatus frontatus</i> (Eastern Shrike-tit)</li> <li><i>Neophema elegans elegans</i> (Elegant Parrot)</li> <li><i>Petroica boodang boodang</i> (Scarlet Robin)</li> <li><i>Turnix varius varius</i> (Painted Buttonquail)</li> <li><i>Zanda funerea whiteae</i> (Yellow-tailed Black Cockatoo)</li> <li><i>Falco peregrinus macropus</i> (Peregrine Falcon)</li> <li><i>Antechinus flavipes</i> (Yellow-footed Antechinus)</li> <li><i>Trichosurus vulpecula</i> (Common Brushtail Possum)</li> <li><i>Corcorax melanorhamphos</i> (White-winged Chough)</li> <li><i>Pseudophryne bibronii</i> (Brown Toadlet)</li> <li><i>Zoothera lunulata halmaturina</i> (South Australian Bassian Thrush)</li> </ul> <p><u>Patch</u><br/>Threatened Fauna Score: = 0.1 (all)<br/>Unit Biodiversity Scores: =<br/>VA1: 19.48<br/>VA3: 24.86</p> | <u>Seriously at Variance</u>   | <p>The removal of this small strip of bushland and pruning of trees is not expected to have a significant impact on these fauna species as:</p> <ul style="list-style-type: none"> <li>the majority of the patch will remain intact, and the trees will remain to provide some habitat features.</li> <li>The patch and scattered trees are isolated and unlikely to provide habitat critical to population survival for threatened species recorded in the area.</li> </ul> <p>The clearance is not expected to impact:</p> <ul style="list-style-type: none"> <li>population size, extent, structure, continuity, or survivability</li> <li>the area of occupancy of a species</li> <li>habitat critical to the survival of a species</li> <li>recovery of a species</li> <li>presence of invasive species</li> </ul> |
| <b>Principle 1c - plants of a rare, vulnerable or endangered species</b> | <p><u>Threatened species</u> identified in this area within the last 25 years that are known to occur within, or likely to use the site:</p> <ul style="list-style-type: none"> <li><i>Austrostipa gibbosa</i> (Swollen Spear-grass)</li> </ul>  | <p><u>Seriously at Variance</u><br/>VA1<br/><u>Not at Variance</u></p> | <p>The removal of this small strip of bushland and pruning of trees is not expected to have a significant impact on these flora species as:</p>   |



|   |  |                        |  |
|---|--|------------------------|--|
|   | <ul style="list-style-type: none"> <li>• <i>Caladenia leptochila</i> (Narrow-lipped Spider-orchid)</li> <li>• <i>Glycine tabacina</i> (Variable Glycine)</li> <li>• <i>Eucalyptus fasciculosa</i> (Pink Gum)</li> <li>• <i>Eucalyptus viminalis</i> ssp. <i>viminalis</i> (Manna gum)</li> <li>• <i>Caladenia gladiolata</i> (Bayonet Spider-orchid)</li> <li>• <i>Austrostipa multispiculis</i> (Many-flowered Spear-grass)</li> <li>• <i>Thelymitra ixioides</i> (Spotted Sun-orchid)</li> <li>• <i>Prasophyllum pruinosum</i> (Plum Leek-orchid)</li> <li>• <i>Pterostylis foliata</i> (Slender Greenhood)</li> <li>• <i>Thelymitra flexuosa</i> (Twisted Sun-orchid)</li> <li>• <i>Thelymitra grandiflora</i> (Great Sun-orchid)</li> </ul> <p><u>Threatened Flora Score</u> =<br/>VA1: 0.4<br/>VA3: 0</p> | VA3                    | <ul style="list-style-type: none"> <li>• The majority of the patch will remain intact, especially in VA1 where the vegetation backs onto a continuous patch.</li> <li>• The patch is highly disturbed by weed species, so it is unlikely that Threatened species (other than the <i>Eucalyptus</i> species, which were observed) will occur.</li> </ul> <p>The clearance is not expected to impact:</p> <ul style="list-style-type: none"> <li>• population size, extent, structure, continuity, or survivability</li> <li>• the area of occupancy of a species</li> <li>• habitat critical to the survival of a species</li> <li>• recovery of a species</li> <li>• presence of invasive species</li> </ul> |
| <b>Principle 1d - the vegetation comprises the whole or part of a plant community that is Rare, Vulnerable or endangered:</b> | <p><u>Threatened communities</u><br/>None<br/><u>Threatened Community Score</u> =1</p>   | <u>Not at Variance</u> |  |

## 4.6 Risk assessment

***Determine the level of risk associated with the application***

|   |                                    |       |
|---|------------------------------------|-------|
| <b>Total clearance</b>  | No. of trees                       | N/A   |
|   | Area (ha)                          | 0.159 |
|   | Total biodiversity Score           | 4.11  |
| <b>Seriously at variance with principle 1(b), 1(c) or 1 (d)</b> | 1(b), 1(c)                         |       |
| <b>Risk assessment outcome</b>                                  | Level 3 (escalated from a Level 2) |       |

## 4.7 NVC guidelines

***Provide any other information that demonstrates that the clearance complies with any relevant NVC guidelines related to the activity.***

NA

# 5. Clearance summary

**Clearance area(s) summary table**

| Block        | Site | Species diversity score | Threatened Ecological community Score | Threatened plant score | Threatened fauna score | UBS   | Area (ha)    | Total Biodiversity score | Loss factor | Loadings | Reductions | SEB Points required | SEB payment       | Admin Fee       |
|--------------|------|-------------------------|---------------------------------------|------------------------|------------------------|-------|--------------|--------------------------|-------------|----------|------------|---------------------|-------------------|-----------------|
| 1            | 1    | 3                       | 1                                     | 0.04                   | 0.1                    | 19.48 | 0.126        | 2.45                     | 1           |          |            | 2.58                | \$2,858.03        | \$157.19        |
| 1            | 2    | 12                      | 1                                     | 0                      | 0.1                    | 44.38 | 0.021        | 0.93                     | 1           |          |            | 0.98                | \$1,084.87        | \$59.67         |
| 1            | 3    | 3                       | 1                                     | 0                      | 0.1                    | 24.86 | 0.12         | 0.52                     | 1           |          |            | 0.55                | \$607.77          | \$33.43         |
| <b>Total</b> |      |                         |                                       |                        |                        |       | <b>0.159</b> | <b>3.9</b>               |             |          |            | <b>4.11</b>         | <b>\$4,550.67</b> | <b>\$250.29</b> |

**Total summary table**

|             | Total Biodiversity score | Total SEB points required | SEB Payment | Admin Fee | Total Payment |
|-------------|--------------------------|---------------------------|-------------|-----------|---------------|
| Application | 3.9                      | 4.11                      | \$4,550.67  | 250.29    | \$4,800.96    |

|                           |      |
|---------------------------|------|
| Economies of Scale Factor | 0.50 |
| Rainfall (mm)             | 829  |



# 6. Significant Environmental Benefit

A Significant Environmental Benefit (SEB) is required for approval to clear under Division 5 of the *Native Vegetation Regulations 2017*. The NVC must be satisfied that as a result of the loss of vegetation from the clearance that an SEB will result in a positive impact on the environment that is over and above the negative impact of the clearance.

## ACHIEVING AN SEB

Indicate how the SEB will be achieved by ticking the appropriate box and providing the associated information:

- ☐ Establish a new SEB Area on land owned by the proponent.
- ☐ Use SEB Credit that the proponent has established. Provide the SEB Credit Ref. No. \_\_\_\_\_
- ☐ Apply to have SEB Credit assigned from another person or body. The [application form](#) needs to be submitted with this Data Report.
- ☐ Apply to have an SEB to be delivered by a Third Party. The [application form](#) needs to be submitted with this Data Report.
- ☒ Pay into the Native Vegetation Fund.

# 7. Appendices

**Appendix 1:** Bushland and scattered tree assessment scoresheets associated with the proposed clearance.

**Appendix 2:** Site maps as shape files

**Appendix 3:** General Construction Designs (PDF).